cell much less produced outwards than in the former genus, but decidedly more than in the latter. Vein 2 from a little beyond the middle of the cell, 3 from midway between 2 and the lower angle, 4 from the angle, 5 from just above the angle and so forming a short right angle with the discocellular before receding basewards, 6 from below the upper angle; 7, 8, and 9 stalked, 7 and 8 from about midway between the angle and the termen, 9 from nearer the cell than vein 8; 10 absent; 11 long, from the cell reaching nearly to the apex: secondaries with 1 and 1 *a* stalked for nearly half the length of 1; lower part of cell and veins 2, 3, 4, 5 as in *Marshalliana*; vein 6 from well below the upper angle, 7 from the upper angle, 8 with a bar to the cell as shown in the figure of the neuration of *Metarbela umtaliana*, Auriv.*.

Type, *Catarbelana bassa*, B-B.

This genus will come after *Marshalliana*, Auriv., but before *Catarbela*, Auriv.

Catarbelana bassa, sp. n.

♂. Head, thorax, abdomen, and primaries uniform pale brown. Primaries with fine dark reticulations all over the wing, but with two prominent dark lines, viz. the postmedian line and the subterminal, the former slightly excurved for upper portion, but sharply incurved on the fold, the subterminal line being nearly erect for the upper part to vein 3, where it is angled outwards into the tornus about vein 2; a dark basal dash on the inner margin to over a half, rising in a short basal tuft: secondaries uniformly darker brown than the primaries.

Expanse 34 mm.

Hab. N. Nigeria, Lokoja District.

Type in my collection.

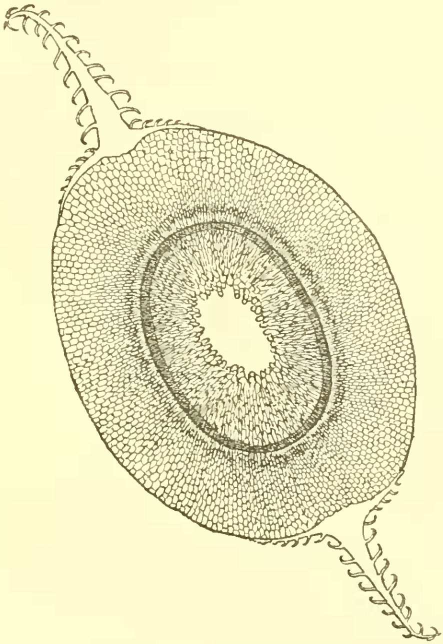
XXXI.—*A new Freshwater Polyzoon from S. Africa.* By Igerna B. J. Sollas.

A collection of freshwater organisms from the Valkenberg Vlei, near Cape Town, was brought to me in October 1907 by Miss Stephens, who tells me that her collection is the first which has been made in that Vlei. Thanks to her care in daily supplying the organisms with fresh water during the

* Ent. Tids. 1901, p. 127.

voyage to England, some of them were still alive when she handed them over to me. The most noteworthy among them was a colony of freshwater Polyzoa attached to a stem of triangular section. It had produced numerous statoblasts, some of which were still contained in the parent colony, while others, and these were the greater number, were free and lay at the bottom of the jar. A long process at each end rendered the appearance of the statoblasts strikingly different from the reproductive bodies of Polyzoa with which I was familiar. I consequently showed them to Dr. Harmer, who recognized them as probably belonging to a new species of *Lophopus* allied to *Lophopus carteri*, Hyatt (=*Lophopodella* sp., Rousselet).

Fig. 1.

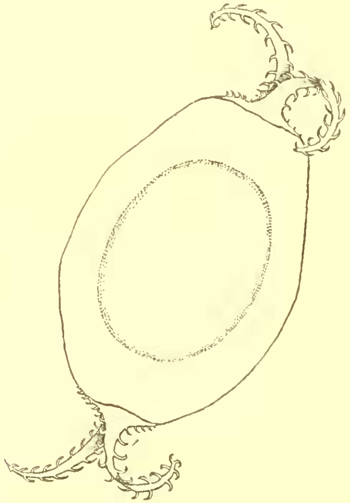


A single valve of a statoblast of *Lophopus capensis*. The artist has not represented the air-cells quite correctly: they have the usual hexagonal form.

Definition.—The new species, which I propose to call *Lophopus capensis*, is referred to the genus *Lophopus* on account of its thick gelatinous ectocyst and of the form of its statoblasts, which are elliptical and rendered pointed by the possession at each end of a long process. This process affords the most distinctive character of the species: it is expanded at the base and beset on each side with a double row of recurved hooks, which extend with the expanded base along the edge of the statoblast (figs. 1, 2, and 8).

Owing to the scantiness of the material, which consists of a single colony, it is not possible to give a fuller diagnosis, but the following further facts may be added. On the outside of the thick gelatinous ectocyst a number of unicellular algæ

Fig. 2.

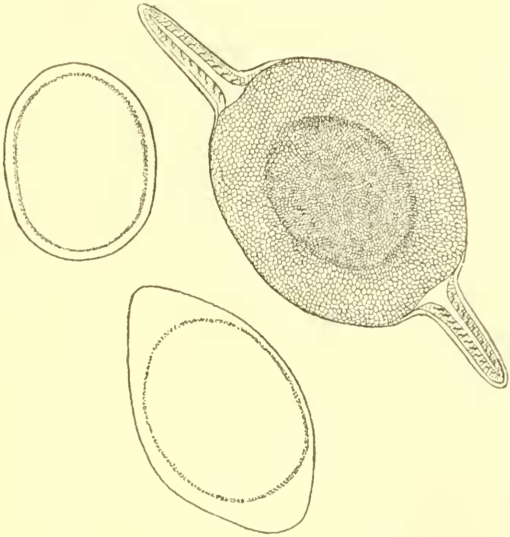


A statoblast of *L. capensis*, showing the splitting of the terminal processes previous to germination.

are lodged. The colony was killed by the use of cocaine and formaline. When the animals were being anæsthetized a counting was made of their tentacles. In one case there were in all 57 (error certainly not more than 3), in another in a less favourable position 70+ (probably about 74).

The average dimensions of the statoblasts are ·8 × ·64 mm., the length not including the length of the processes, each of which measures ·32 mm. The central capsule measured in one case 0·52 × 0·44 mm. The process, which is flattened in the same plane as the statoblast, is beset laterally with a double row of recurved hooks on each side, and these hooks extend to the edge of the expanded base of the process. The processes split longitudinally in the plane in which the statoblast is flattened some time before the statoblast itself splits into its constituent valves (fig. 3). By counting the number of hooks on a given length of a process before it has split, and afterwards, it is found that there were twice as many before as after on a given length and that the distances between them are half as great. It thus appears that the hooks themselves do not split, but are arranged in a double row on each side, which, when splitting occurs, becomes divided into a single row on each side of each half of the process.

Fig. 3.



Three immature statoblasts of *L. capensis.*

Some immature statoblasts were sent by another collector to Dr. Rousselet, who, on hearing that I was describing the species, very kindly lent his preparation of them to me. Among the immature statoblasts are some which have the size and form of the central capsule. The terminal process is added last of all, during the completion of the development of the annulus (fig. 3).

Annandale (' Records of the Indian Museum,' 1907, vol. i. part ii. pp. 145–149) describes a new variety of *Lophopus* *lendenfeldi*, var. *himalayanus* *, which apparently forms a link between the present species and *Lophopus crystallinus*. In this variety (i.) processes are present at the ends of some of the statoblasts, but are absent from others; (ii.) the central process is larger than the others, and bears, in addition to a distal circle of minute, curved, blunt processes, others which are arranged irregularly nearer the statoblast. It is easy to see how, by an increase in size of the central process of a statoblast like that of *Lophopus lendenfeldi*, var. *himalayanus*, a statoblast such as we find in *Lophopus capensis*, sp. n., might have arisen.

It is interesting also to notice that *Pectinatella davenporti*, a new species described by Oka, possesses a large number of processes beset with recurved hooks, somewhat resembling those of *L. capensis*, but differing from them chiefly in being very minute.

The fact that the statoblasts, although possessing a fairly well-developed annulus, sink to the bottom, calls for some attention; it may possibly explain the use of the hooks, which by catching in foreign objects would serve to prevent the statoblast from falling too far below the surface of the water to less well oxygenated layers. I have seen as many as six statoblasts linked into a chain by the interlocking of their hooks, and on one occasion, when I carried some of the statoblasts with me on a short railway journey, I found that through the shaking of the train every one of the statoblasts had become entangled in some floating green filamentous alga in the water containing them, and they remained in that position and hatched there. All the others which hatched in my possession were kept in open glass dishes in water not as much as 1 cm. in depth, while those kept in a tall vessel in water say 30 cm. deep did not hatch.

Braem, in discussing the germination of the statoblasts, emphasizes the importance of a position near the surface of the water for germination. He has shown that suspension of respiration is necessary to render the contents of the statoblast capable of germination. In general this is brought about by enclosure in ice. But the lack of oxygen in the bottom-mud is so great that a sojourn there was equally effective. In the case of *Cristatella*, he concludes, on indirect evidence (viz. the fact that statoblasts are found in the slimy bottom-mud), that the hooks, by catching in loose weed which afterwards sinks to the bottom, are the cause of

* The name *himalayanus* is given to the new variety on p. 147, but in the table on p. 148 it is called *indica*, apparently by oversight.

submersion of a great many of the statoblasts; the sunk statoblasts having been rendered capable of germination by deprivation of oxygen rise again, buoyed up by the annulus, after the entangling weed has completely decayed, and germinate at the surface. It would be interesting to know whether there are any direct observations on this point and whether all the statoblasts of *Cristatella* are equally buoyant. We cannot, of course, argue from one case to another; the conditions in a S.-African vlei are very different from those which obtain in the waters in which *Cristatella* lives. But it is worth while to note the various functions which have been attributed to the hooks.

Oka's remarks on the annulus and hooks are specially interesting in connexion with the present species. He lays stress on the importance as distributing-organs of the hooks on the statoblasts of *Cristatella* and of *Pectinatella magnifica*, "in which the annulus is but weakly developed and cannot serve as more than a mere buoy," contrasting this condition with the extreme insignificance of the minute hooks of *Pectinatella gelatinosa*, in which the annulus is very large and shows curvature.

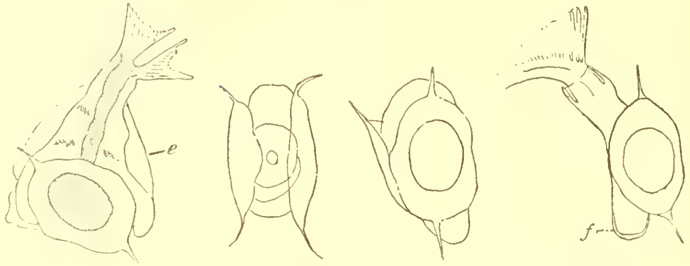
In *Lophopus capensis*, in which the annulus does not even serve as a buoy, hooks would evidently have great importance in more than one respect, and to this is no doubt due their marked development.

These foregoing cases might suggest that in general an inverse relation would be found to exist between the degree of development of the annulus and of hooks; but this does not prove to be supported by the facts. The relative dimensions of the central capsule and the annulus in *Plumatella vesicularis*, for example, which has no hooks, are, judging from Braem's figure, much the same as in *Lophopus capensis*, the total amount of air-space being, if anything, smaller in *P. vesicularis*. But the thickness of the wall of the central capsule of *Lophopus capensis* is noticeably greater than in any other statoblast I have seen figured; and as chitin is considerably heavier than water (sp. gr. 1·4), this may, perhaps, be sufficient to account for the incapacity of the statoblasts to float.

Apparently a period of cessation of respiration is not necessary to render the statoblasts of *Lophopus capensis* capable of germination, for those which I have been dealing with had but newly escaped from the parent colony when they came into my possession, and shortly afterwards the greater number of them hatched.

On Nov. 5, 1907, I first noticed that one or two of the statoblasts had germinated, and after that quite a number of others did so. When germination occurs, or, rather, some

Fig. 4.



A young individual (B) shortly after germination in four positions, Nov. 5–7, 1907. *e*, ectocyst ; *f*, thickened epithelium or foot.

Fig. 5.

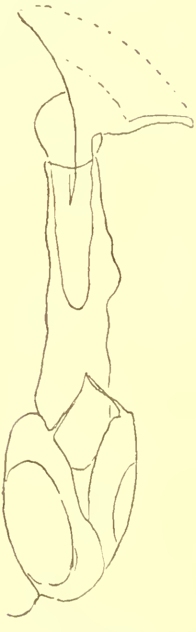


Fig. 6.

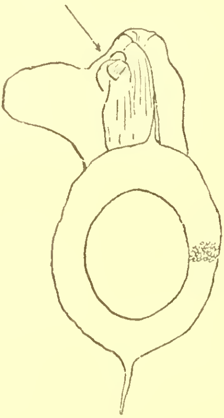
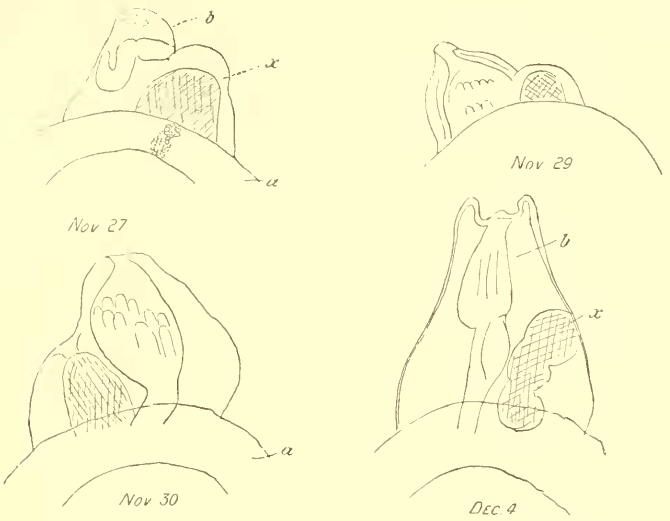


Fig. 5.—A young individual which emerged from its valves.
Fig. 6.—Individual B: appearance of bud when first noticed on Nov. 25, 1907. Zeiss obj. A, eyepiece 3.

time before that, the process splits lengthwise into two, one at each end of each valve, and each half then carries a single row of hooks. After germination the float becomes much paler in colour and more transparent, and sometimes, but not always, the hooks drop off from the processes. When they do so the appearance of the valves is considerably altered. At first this changed appearance occasioned some doubt as to whether a second species was not present, but daily inspection of individual statoblasts showed that the fact is as I have just stated. Boiling the valves in weak caustic potash also removes the hooks.

Fig. 7.

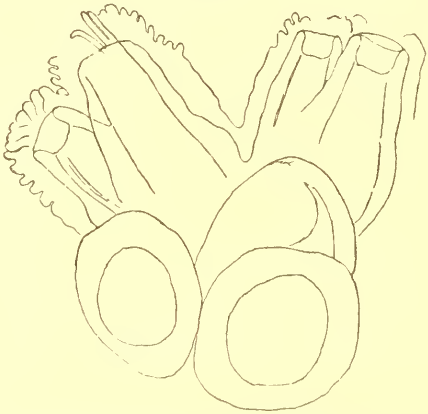


Four positions of the first bud, showing the accompanying degeneration of the original polypide B. Zeiss obj. A, eyepiece 3. *a*, annulus; *b*, bud; *x*, old individual.

The young individuals newly hatched from a statoblast have the power of holding on to a solid substratum by means of a thickened region of the ectoderm or foot (fig. 4). They can thus offer considerable resistance to the sucking of a pipette. They can also change their position relatively to the valves. One individual (fig. 5) emerged from its valves, remaining adherent to them only by its foot. An ectocyst is shown in fig. 4, and was noticed in a number of other cases. It is most probable that in those figures in which it is omitted it was merely overlooked owing to its extreme transparency at this early stage and to the fact that weeds had not as yet settled upon it.

Three weeks after hatching (on Nov. 25) two individuals were seen to show signs of budding; the parent was retracted, and though I watched it constantly I never saw it expand its tentacles again, though dilatation and contraction of the body-wall occurred. The retracted tentacles of the parent lost their outlines and became an opaque mass (fig. 7), and when the young bud grew more active and expanded considerably (Dec. 4), it was clear that the original polyp had degenerated. The two individuals had reached this stage of

Fig. 8.



Young colony formed of descendants of individual B, Jan. 16, 1908. Zeiss obj. A, eyepiece 2.

budding when I left them until Jan. 15, 1908. I then found that one was dead, and the other had given rise to a colony (individual B, fig. 4) of four polypides. The valves of the statoblast were still adherent to the young colony (fig. 8). An ectocyst was present, but had to be looked for with great care even after its presence was known, as it was so exceedingly transparent and presumably of a refractive index not differing much from that of water; its surface is deeply folded or wrinkled in parts, as seen in fig. 5. The polypides fed actively, and soon buds appeared. On Jan. 20 I most unfortunately handled the colony with a pipette which had been used in a solution of weak caustic potash. This caused the ectocyst to become opaque and swell up. On Jan. 22 I noticed that the orifices in the ectocyst had been closed by this swelling and the polypides were trying in vain to emerge. I consequently removed with needles the caps of ectocyst which shut in each of the four individuals, and all the four polypides then expanded and fed on that day and on the thirteen days following it. On Feb. 4 one individual had lost half of its lophophore, and on the succeeding days the other individuals one by one vanished. To what cause this disappearance was due I was not able to determine. Individuals of *Cyclops* were present in the water, but I removed these as soon as the first individual was noticed to be imperfect.

A second batch of statoblasts hatched at the end of March and beginning of April, but none of these lived long, probably because the supply of minute green algæ which came with them from Africa had run out.

Rousselet comments on the small number of Polyzoa known from African freshwaters, the total then being eight species. *Lophopus capensis* is the ninth, and it is noticeable that of nine species three would belong to Rousselet's genus *Lophopodella* if that genus were to stand. But, as Annandale remarks, the chief character in which *Lophopodella* differs from *Lophopus* is the presence of hooked processes at the extremities of the statoblast; and seeing that *L. lendenfeldi*, var. *himalayanus*, possesses statoblasts some of which bear hooked processes while others lack them, the importance of this character in classification is weakened, and it can hardly be regarded as of generic value. The species of *Lophopodella* should therefore be included in *Lophopus*.

In conclusion, I wish to thank Dr. Harmer for much kind help and interest.

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